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Field Guide for Managing Rabbitbrush in the Southwest

Forest Service

Southwestern Region

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Cover Photos

Top left: Green rabbitbrush, USDA Forest Service
Top right: Green rabbitbrush flowers, Mary Ellen Harte, Bugwood.org
Bottom left: Rubber rabbitbrush flowers, USDA Forest Service
Bottom right: Rubber rabbitbrush, USDA Forest Service

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Green Rabbitbrush (*Chrysothamnus viscidiflorus)*
Rubber Rabbitbrush (*Chrysothamnus nauseosus*, syn. *Ericameria nauseosa)*

Sunflower family (Asteraceae)

Green and rubber rabbitbrush are native shrubs that grow widely across western U.S. rangelands. Though they can appear as a weedy monoculture (especially following disturbance), they are early colonizers and their presence can be reduced under improved management regimes. This field guide serves as the U.S. Forest Service's recommendations for management of green rabbitbrush and rubber rabbitbrush in woodlands, rangelands, and deserts associated with its Southwestern Region. The Southwestern Region covers Arizona and New Mexico, which together have 11 national forests. The Region also includes four national grasslands located in northeastern New Mexico, western Oklahoma, and the Texas panhandle.

Description

Green rabbitbrush (synonyms: yellow rabbitbrush, Douglas rabbitbrush, chamisa) and rubber rabbitbrush (synonyms: gray (also grey) rabbitbrush, golden rabbitbrush, chamiso blanco) are native shrubs and, while often unwanted, are usually not considered to be invasive. The genus *Chrysothamnus* is very complex with as many as 16 species and 41 subspecies described in the literature. Some species are widespread geographically, and some are restricted to a limited area. The specific rabbitbrush species of concern should always be known before proceeding with management. In this guide, suggestions for management are directed mostly toward green and rubber rabbitbrush, but control methods may be applicable to other species as well.

Growth Characteristics

Both species of rabbitbrush are perennial, warm season, native shrubs with rounded or pyramidal-shaped canopies. Characteristics for both species are summarized in table 1.

In addition to the growth characteristics shown in table 1, both species exhibit the following:

- A deep root system with a taproot and less developed lateral roots.
- Flowers are perfect, meaning both male and female structures are present within each flower.
- Reproduce vegetatively and via seed; seeds are wind disseminated achenes with a pappus; seed ripens in autumn, but may germinate in either the spring or fall with available soil moisture. Though

Table 1. Growth characteristics

Species	Vegetative Appearance	Stems	Leaves	Flowers
Green rabbitbrush	Grows 12–48 inches tall with a more compacted crown width.	Smooth, greenish-yellow stems.	Green rabbitbrush leaves are linear similar to rubber rabbitbrush but lack a felt-like layer. Instead, they have a bright green dotted appearance and are arranged in a slight spiral at the stem.	Green rabbitbrush subspecies tend to have smooth, papery, layered involucres and appear sticky at the base of the flower clusters.
Rubber rabbitbrush	Open, wide-spreading crown; grows to 12–90 inches tall and are typically 0.2- to 3-feet wide, but may grow as wide as tall.	Upright, yellowish-green, flexible stems from base with a grayish-white appearance due to the presence of dense, tangled, felt-like white hairs.	Rubber rabbitbrush leaves are linear, less than 0.04-inch wide, and covered by a felt-like layer that serves to insulate and reduce evapotranspiration.	Though appearance varies between rubber rabbitbrush subspecies, flowers tend to be yellow in color, tubular shaped, and occur in clusters at the tips of upright stems. The grayish subspecies tend to have tangle-haired bracts (involucres) below the flower.

abundantly produced, seeds do not persist in the seed bank; typically, seed is viable for less than 3 years. Germination occurs over a broad range of temperatures, requires at least 13 percent soil moisture, and may be inhibited by soil conditions of high salinity. Vegetative sprouts emerge from buds located on lower stems and the root crown at or slightly below the soil surface.

Ecology

Impacts/Threats

Green and rubber rabbitbrush are well suited for restoration and are commonly planted on damaged sites, especially strip mines, road cuts, and severely deteriorated rangeland. When intentionally planted, these shrubs establish easily and grow rapidly into uniform stands. On undisturbed rangelands, green and rubber rabbitbrush will increase in cover and density after fire or heavy disturbance. With time and improved management, they usually become less noticeable as sagebrush and other associated species return.

Location

These shrubs favor sunny, dry, open sites and tend to grow on medium to coarse-textured soils such as sandy, gravelly, or loam soils. Rubber rabbitbrush tolerates a wide range of pH values, from moderately acidic to basic or strongly alkaline. It is often one of the first plants to colonize an area following extreme disturbance and can even establish and grow in harsh soil conditions such as mine spoils. Green rabbitbrush is somewhat tolerant of saline soil and is used as an indicator species for degraded sites. Both rabbitbrush species span a wide range of elevations from sea level to 10,500 feet.

Spread

Rabbitbrush propagates vegetatively and by seed; all species of rabbitbrush are very prolific seed producers. Seed is easily dispersed via wind, water, humans, birds, and rodents. Seed is also spread over long distances by adhering to surfaces and undercarriages of road vehicles and road maintenance equipment.

Invasive Features

Although not invasive, rabbitbrush can increase substantially, particularly in disturbed areas such as abandoned crop fields, overgrazed areas, or rangeland that has been replanted. While rabbitbrush rapidly expands following a disturbance, it is not overly competitive and may actually serve to (1) build soil stability and structure, (2) prevent other more detrimental species from establishing, and (3) create a favorable microclimate for more desirable plants to establish.

Management

Early detection, control, and followup monitoring of rabbitbrush coupled with efforts that improve range condition are important for long-term rabbitbrush management. Due to copious seed production and a tendency to vegetatively reproduce following surface disturbance, rabbitbrush populations can quickly become a dense monoculture. If a localized population needs to be removed to meet a particular land use goal, it is highly recommended to treat rabbitbrush and reseed simultaneously in the fall (single entry approach) to prevent other weedy species from establishing. The following actions should be considered when planning an overall management approach:

- Healthy plant communities should be encouraged and maintained to limit rabbitbrush infestations.
- Detect, map, and eradicate new populations of rabbitbrush as early as possible. Keep annual records of reported infestations.
- Implement monitoring and a followup treatment plan for missed plants and seedlings.

Table 2 summarizes some management options for controlling rabbitbrush under various situations. Choice of method(s) taken for rabbitbrush control depends on numerous factors including current land use and site condition, accessibility, terrain, climate, density and

Table 2. Management options*

Site	Physical Methods	Cultural Methods	Biological Methods	Chemical Methods
Roadsides, fencelines, or noncrop areas	Mowing alone will suppress top growth but will not control the plants. Consider mowing in combination with herbicide control.	Clean machinery following activity in infested areas. Train road crews to identify and report infestations.	Leaf beetle (*Trirhabda nitidicollis*) has shown potential for control; however, USDA has not given approval as a biological control agent.	For ground application, use ATV, truck mounted, or tractor pulled spraying equipment. Wash under vehicle after application to prevent spread.
Rangelands, pastures, or riparian corridors	Physical methods (including prescribed burning) are usually unsuccessful and tend to increase density.	Avoid driving directly through infestation; limit disturbance. Reseed with plants that are desirable and will compete.	Same as above.	For widespread infestations, use ground or aerial broadcast spraying. For sparse infestations, use backpack spraying.
Wilderness, other natural areas, and/ or small infestations	Remove localized populations by hand. Manage to improve overall range health.	After passing through infested area, inspect and remove any seed from animals, clothing, and vehicles.	Same as above.	Use backpack or hand-held sprayers to spot treat plants.

* Choice of a particular management option must be in compliance with existing regulations for land resource.

degree of rabbitbrush infestations, and nontarget flora and fauna present. Other considerations include treatment effectiveness, cost, and number of years needed to achieve control. More than one control method may be needed for each site.

Physical Control

Rabbitbrush top growth is easily removed by cutting, grinding, or mowing; however, plants will quickly sprout new shoots and stems following treatment. The root system is very difficult to extract, and cultivation methods used alone may lead to a further increase in rabbitbrush density.

Manual Methods

Rabbitbrush roots must be completely removed to control the plant. Hand removal by digging, pulling, etc., works on young plants but extracting older shrubs is extremely difficult and is generally not recommended.

Mechanical Methods

Mowing – Mowing used alone as a control method will only suppress top growth. Returning shoot growth may make later control efforts more difficult. Use of a mower system such as the Burch WetBlade™ (now Diamond Co.'s Ecoblade™) rotary mower that simultaneously cuts through unwanted vegetation and applies herbicide onto cut stubble at the same time may be considered. However, reported results using this type of equipment on rabbitbrush have been inconsistent. It is recommended that this type of mower system be tested on a small localized area and results evaluated before proceeding to larger areas.

Tillage – Not recommended except in agronomic situations.

Prescribed Fire

Rabbitbrush usually increases in foliage growth and density following fire; therefore, prescribed burning is not recommended as a stand-alone control treatment.

Cultural Control

Prevention, early detection, and managing overall range health are critical for reducing rabbitbrush density over time. Land managers, the local public, and road crews should be educated as to how to identify rabbitbrush so they can help report all newly established infestations. Vehicles, humans, and livestock should be discouraged from traveling through infested areas; and a program to check and remove seeds from vehicles and livestock should be implemented to help

Table 3. Classical biological control agents

Species	Type of Agent	Site of Attack/Impact	Use/Considerations for Release
Trirhabda nitidicollis	leaf beetle	Both the adult and larvae feed on rabbitbrush leaves, though use by larvae is heavier and more likely to result in mortality.	Moderately effective control is possible; however, USDA approval status for formal use as a biological control agent is uncertain.
Aciurina bigeloviae	gall-forming fly	Cottony galls form on stem and green flower-like growths occur on twigs or small branches.	USDA approval status for formal use as a biological control agent is uncertain.

stop dispersal. If possible, weed screens should be used on irrigation water intakes in infested areas to prevent seed transportation in irrigation canals.

Biological Control

Grazing

Although occasionally browsed by livestock and wildlife, rabbitbrush is not highly preferred and its value varies widely by subspecies and season. Generally, grayish or white subspecies have a higher palatability rating than greenish subspecies. Though considered slightly toxic and of limited value to all livestock, certain rabbitbrush subspecies may receive some light use, especially during winter months. Mule deer, pronghorn, jackrabbits, and other wildlife also make use of rabbitbrush during this same time. Due to the limited season of use and low usage by livestock, grazing as a means of reducing rabbitbrush populations is unlikely to be an effective management tool. Rather, intense grazing should be discouraged to prevent rabbitbrush expansion.

Classical Biological Control

The rabbitbrush leaf beetle and a gall-forming fly have both been observed as being detrimental to rabbitbrush growth (table 3). While it has been suggested that these organisms may be favorable for use as biological control agents, formal approval for release has not occurred.

Chemical Control

While either rabbitbrush species is not easily controlled by herbicide spraying, green rabbitbrush tends to be more difficult to kill than rubber rabbitbrush. All herbicides recommended in table 4 will control or suppress rabbitbrush when properly applied. Each herbicide product listed in the table has different requirements and restrictions according to the label. Check label mixing instructions when preparing an oil-water emulsion. Read and understand the label prior to any application. Consult the registrant if you have questions or need further detail.

For effective control, growing conditions and spray timing must be ideal at the time of treatment. If not, then herbicide spraying will likely suppress rabbitbrush but not give a high degree of preferred plant kill. Before spraying, always check targeted rabbitbrush plants carefully for healthy foliage that has been produced from favorable soil moisture and growing conditions. Preferably, soil should be moist in the top 4 inches. Plants that are drought stressed should never be sprayed.

Treatment timing with herbicides is critical for successful control of rabbitbrush. When considering a spring application (typically late April–May), it is best to spray in a year when the previous winter precipitation has been above normal and rabbitbrush has produced abundant leaders and leaves (2.5–4 inches of new growth). Clopyralid or picloram applied in combination with 2,4-D are the herbicides recommended for spring treatment. Fall applications should be made in years with above normal summer rainfall and when rabbitbrush has reached the late to post-flower stage (typically late September–October). Picloram or a herbicide combination of picloram + fluroxypyr are recommended for fall treatments. Hexazinone is a nonselective soil sterilant and can be applied any time of the year. However, hexazinone treatments can severely damage nearby desirable plants and the herbicide is best used as a spot treatment applied directly to individual rabbitbrush plants before anticipated rainfall in late fall.

Table 4. Herbicide recommendations

Common Chemical Name (active ingredient)	Product Example[1]	Product Example Rate per Acre[1] (broadcast)	Backpack Sprayer Treatment Using Product Example[2]	Time of Application	Remarks
Aminocyclo-pyrachlor + metsulfuron methyl + triclopyr	Streamline + Garlon 3A	4.75 to 8 oz + 1.0 to 1.5 lb	Add 5 to 9 grams of dry flowable powder to 1 gal water	Most effective in late summer-early fall before frost.	Persistent; selective for broad-leaved plants and certain brush species; may cause temporary injury to some grass species. A selective blend of active ingredients labeled for use in non-crop areas such as uncultivated, non-agricultural areas (highways, utility rights-of-way, etc.); uncultivated, non-crop producing, agricultural areas (farmyards, fence rows, non-irrigation ditch banks, etc.); and natural areas (wildlife management areas, wildlife openings, wildlife habitats). Can be used in riparian areas. May also be used on public, private, and tribal lands as part of an early detection and rapid response (EDRR) in treating infestations of invasive weed species.
Clopyralid + 2,4-D	Curtail	2.2 kg/ha	1-3%	During active growth with 2.5–4 inches of new growth, but when grasses are going dormant	Selective, post-emergent broadleaf herbicide. Not recommended for areas with rapid soil permeability such as sandy loams to sandy soils. Use medium to coarse droplet spray setting; do not apply when wind speeds exceed 15 mph.
Picloram	Tordon 22k	1 to 2 qt	1.5-3%	Late post-flower stage with favorable soil moisture	Selective; affects many broadleaf species but will not harm most grasses.
Picloram + fluroxypyr	Surmount	3 to 6 pts	1%	Same as above	Best for late season control. Rabbitbrush control is not listed on the specimen label. Check with the manufacturer concerning specific localized recommended rates.
Picloram + 2,4-D	Grazon P+D	2 qt (As an alternative, mix Tordon at 2-3 pints per acre plus 1-2 pints of 2,4-D ester with a high quality oil based adjuvant)	1.5-3%	During active growth with 2.5–4 inches of new growth in spring	Selective; affects many broadleaf species but will not harm most grasses. Best for early season control.

Table 4. Herbicide recommendations

Common Chemical Name (active ingredient)	Product Example[1]	Product Example Rate per Acre[1] (broadcast)	Backpack Sprayer Treatment Using Product Example[2]	Time of Application	Remarks
Hexazinone	Velpar	n/a	4-6 mL per 3 ft of canopy diameter	Any time of year; best just before rain. Do not use on frozen soil.	Not recommended for soils with high clay content. Use individual plant treatment (IPT). Apply undiluted within 3 feet of base of stems.
Hexazinone	Pronone power pellets	n/a	1 pellet per 2 ft. plant diameter	Same as above.	Use IPT. Scatter pellets around drip line of canopy.

[1] Trade names for products are provided for example purposes only, and other products with the same active ingredient(s) may be available. Individual product labels should be examined for specific mixing information and appropriate use with rabbitbrush.

[2] Herbicide/water ratio - As an example, a gallon of spray water with a 3 percent mixture is made by adding a sufficient volume of water to 4 ounces of herbicide until a volume of 1 gallon is reached (4 oz/gal ÷ 128 oz/gal = 0.03 or 3 percent).

Herbicides may be applied in several ways including backpack, ATV or UTV sprayers, or conventional boom sprayers that are pulled or attached to a tractor or truck. For rubber rabbitbrush, the effectiveness of foliar-applied herbicides can be improved by using a high spray volume (~ 20 GPA) that helps saturate its felt-like leaf and stem layer. For sparse populations of either rabbitbrush species, one person or a small team can treat the rabbitbrush by using an individual plant treatment (IPT) approach. Isolated plants may be spot sprayed by wetting the foliage and stems without dripping through the use of an adjustable spray nozzle attached to a hand-held or backpack sprayer. An alternative is to apply a soil treatment for each target plant at the canopy drip line or at the base of the rabbitbrush. A broadcast approach may be used to address medium to large infestations.

Control Strategies

Because each treatment situation is unique, any strategy adopted for managing rabbitbrush must involve careful planning. A clear picture of goals and objectives for specific treatment sites and a plan for improving overall management is a must for rabbitbrush control. Treated areas should be monitored periodically, especially for the return of desirable native plant species and to remove unwanted invasive plants.

Consider addressing smaller, less dense populations or isolated plants on areas with healthy perennial grass understory first. Next, plants at the perimeter of heavily infested areas should be treated. The larger, denser cores of the infested area should be addressed in the final stage of treatment. An important component of successful long term rabbitbrush control is to promote vigorous competition from desirable perennial plants, especially grasses. Rabbitbrush prefers germinating in open areas, and propagation is poor when there is a vigorous grass component.

Reseeding with desirable plant species should always be considered where feasible. However, the decision to reseed should always be made well in advance of any rabbitbrush control effort. This is because the reseeding choice directly affects how best to proceed with control efforts. Reseeding may not be necessary if there is a good source of understory vegetation remaining on the treatment site.

References and Further Information

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Suggested Web Sites

For information about calibrating spray equipment:

NMSU Cooperative Extension Service Guide A-613 Sprayer Calibration at http://aces.nmsu.edu/pubs/_a/A-613.pdf

Herbicide labels online:

http://www.cdms.net/LabelsMsds/LMDefault.aspx

For more information or other field guides, contact:

USDA Forest Service
Southwestern Region
Forest Health
333 Broadway Blvd., SE
Albuquerque, NM 87102

Or visit:

http://www.fs.usda.gov/main/r3/forest-grasslandhealth/invasivespecies